

Mercury Emissions

Background

Exposure to mercury comes primarily from eating contaminated fish. Children and pregnant women are especially susceptible to health threats caused by mercury contamination, and exposure to even relatively low levels potentially can cause permanent brain damage to the fetus, infants and young children. Mercury contamination in New Jersey is caused by emissions both from long-range sources, such as coal-burning power plants in China, and from regional and local sources such as coal-burning power plants in central and western U.S. and in-state power plants, incinerators, and industrial facilities. Contaminated fish have been found in remote areas of the state, such as the Pinelands, as well as in industrialized areas. (See Fish Contamination in this Environmental Trends series.)

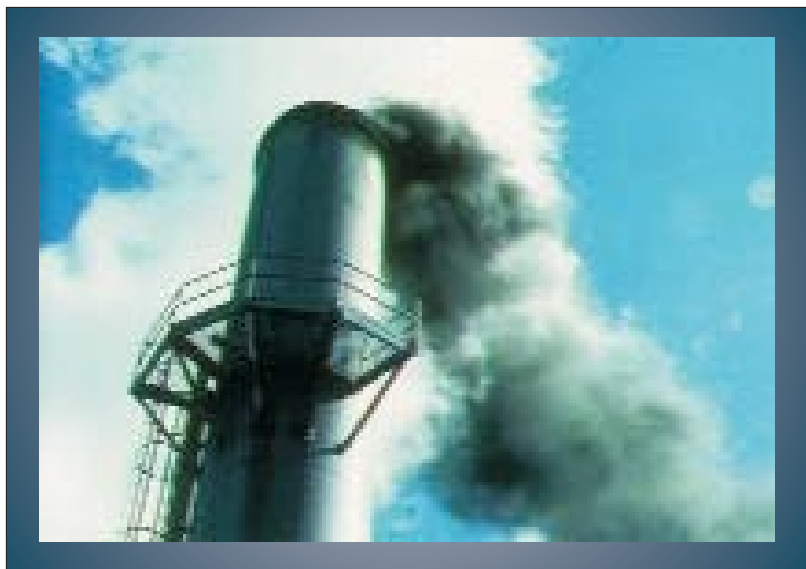
Mercury can contaminate waterbodies either from runoff or from air pollution that deposits it in the water. Once in an aquatic ecosystem, mercury accumulates in the tissues of organisms as methylmercury, a toxic and harmful form of mercury. New Jersey is one of more than 40 states that have issued fish advisories for certain species of fish contaminated with mercury. Studies have shown that reducing mercury emissions can significantly reduce contamination in nearby ecosystems.¹ The great majority of pregnant women in New

Jersey appear to have low levels of exposure to mercury. However, a small, but significant fraction of the pregnant population does have elevated exposures to methylmercury from fish consumption; as reported in the NJ Mercury Task Force, a study of mercury concentrations in hair of a sample of pregnant women in New Jersey found that 13% had levels above 1 ppm, considered to represent an unsafe level of exposure.²

The DEP has been working to better understand the impacts of mercury on human health and the environment in New Jersey, and also to better quantify and control mercury emissions. These efforts began in the early 1990s with the establishment of the first Mercury Task Force, which identified municipal solid waste (MSW) incineration as a major source of mercury emissions and recommended stringent controls. These controls were adopted by New Jersey in 1993, reducing mercury emissions from incinerators by more than 90 percent, and were considered a model for other states and the federal government. A second Mercury Task Force convened in 1997 with the objectives of clarifying the impacts of mercury on the state, identifying additional significant sources of mercury to New Jersey's environment, and recommending control and management approaches. The task force developed an extensive body of information on the impacts of mercury, sources of mercury and various control strategies and published its final reports in January 2002.³

Status and Trends

The task force estimated anthropogenic mercury emissions to air, water, and land from a variety of sources in the state. (See "Anthropogenic Mercury Releases and Transfers in NJ" below).



Anthropogenic Mercury Releases and Transfers in NJ¹

Source category	Approx. release (lbs./yr.)	Medium to which release occurs	Source of data(S= stack tests, M = mass balance, ¹ O = other)	Degree of certainty (C = certain, MC = moderately certain, UC = uncertain)
Released to water and land				
Surface & ground water ²	1000	water	M	MC
Landfill leachate	100	water	O	UC
<i>Cultural uses</i>	250	water/land	O	<i>Very uncertain</i>
Sludge application	250	land	M	MC
Total	1600			MC
Released to air				
Steel & iron mfg.	1000	air	S	MC
Aluminum scrap processing	1000	air	O	<i>Very uncertain</i>
Coal combustion	700	air	S	MC
MSW incineration	330	air	S	C
Volatilization (miscellaneous) ³	300	air	O	UC
<i>Cultural uses</i>	250	air	O	<i>Very uncertain</i>
Fluorescent tube breakage ⁵	240	air	O	UC
Sludge incineration	200	air	M	C
Oil refining	200	air ⁴	M	MC
<i>Old painted surfaces⁶</i>	200	air	O	<i>Very uncertain</i>
Crematoria	100	air	M	MC
Residual fuel combustion	100	air	S	UC
Volatilization (laboratory)	100	air	O	UC
Gasoline, diesel, etc. ⁷	50	air	M	UC
Hazardous waste incineration	50	air	S	UC
Thermal treatment ⁸	50	air	O	UC
Landfills	40	air	S	C
Wood combustion	10	air	O	MC
Natural gas combustion	5	air	M	MC
Medical waste incineration	5	air	S	MC
Total	4930			MC
Transferred to NJ disposal sites⁹				
Dredged materials	17,000	na	M	UC
Solid waste (not including out-of-state)	13,600	na	M	MC
Total	30,600			UC

¹ Measured quantities are used to infer a total quantity of mercury, and unknown portions of this total quantity are estimated based on other known quantities.

² Based on DEP discharge monitoring reports covering permitted discharges of mercury and mercury compounds to surface and ground water, and augmented by estimated discharges from private septic systems.

³ Includes estimated volatilization from other discarded items and items in service containing mercury.

⁴ Estimated volatilization from discarded fluorescent tubes during waste handling and processing but before ultimate disposal.

⁵ Quantity is relatively certain, based on sampling and analysis of crude oil. Media to which releases may occur are uncertain; assumed to be primarily air, but could include wastewater or other waste streams.

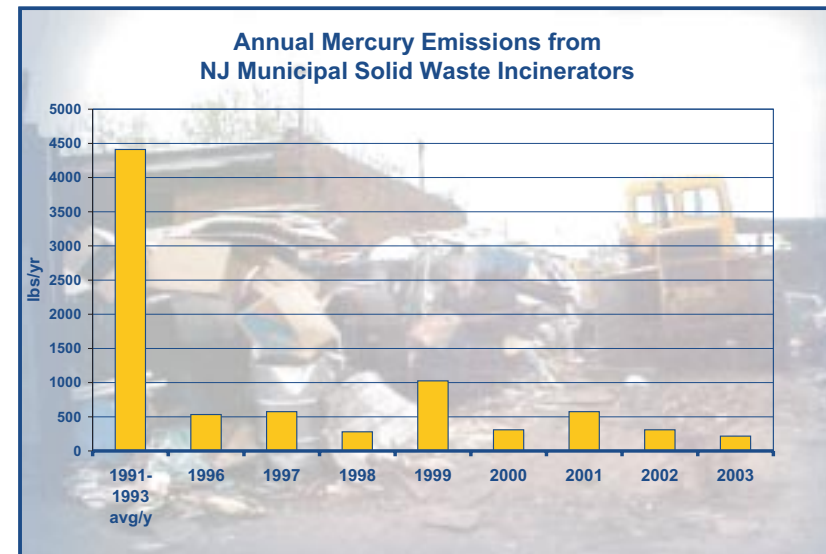
⁶ Emissions from this source category are believed to have been sizeable from the 1960s until the early 1990s, when mercury fungicides were removed from paint. It is estimated that emissions have been rapidly declining since the early 1990s. Estimated 2000 emission is approximately 200 pounds/year; it is expected the quantity will approach zero by 2005.

⁷ Also includes #2 fuel oil, kerosene, and jet fuel.

⁸ Represents emissions from processing of contaminated soils, etc.

⁹ Transferred means moved from one medium to another; e.g. mercury in dredged materials may be moved from sediments to land disposal sites. Disposal sites are presumed to contain mercury, and prevent its release to the environment. Over the long-term, the eventual release rate to the ambient environment is unknown.

DEP data suggest that current mercury releases and transfers in the state are comparable to those shown in the table. One sector, MSW incineration, is required to perform frequent measurements of mercury emissions. These data show some variability from year to year, but indicate an overall emission level in the range of 90 percent lower than emissions from the early 1990s. (See "Annual Mercury Emissions from NJ Municipal Solid Waste Incinerators" below).



Outlook and Implications

The DEP recently has announced new rules that will require further reductions in mercury emissions from certain facilities.¹ The rules call for up to a 90 percent reduction by 2008 of mercury emissions from the state's 10 coal-fired boilers in power plants. The rules allow for some flexibility, giving plants the option of meeting the standards by 2013 if they also make major reductions in emissions of sulfur dioxide, nitrogen oxides and particulates. The rules also require New Jersey's five MSW incinerators to reduce mercury emissions at

least 95 percent below 1990 levels by Jan. 3, 2012. . These protective standards will ensure that these incinerators continue to minimize mercury emissions, eventually reaching a level one-tenth the current federal limit.

The new regulations also mandate a reduction of mercury emissions by 75 percent from the state's six iron and steel melters by 2010. The DEP estimates that iron and steel manufacturing plants are the largest New Jersey-based sources of mercury emissions, with much of their materials coming from shredded automobile scrap metal. The DEP recently completed a pilot project that estimated that motor vehicles disposed of each year in the state contain a total of about 1,000 pounds of mercury in the form of mercury-containing switches.²

In March, 2005, a new law, the Mercury Switch Removal Act of 2005,³ became effective in New Jersey. This law requires automobile manufacturers to develop and fund a plan to remove mercury switches from end-of-life vehicles and requires all scrap yards and automobile dismantlers to remove mercury switches from end-of-life vehicles before sending the auto scrap metal to iron and steel mills, where the mercury would otherwise be released into the air when the vehicles are melted down and recycled. Steps to implement this law are currently underway.

The DEP continues to promote awareness of the risks of mercury through fish advisories and other outreach efforts, and to support mercury research. The DEP expects to track reductions in mercury releases and to report improvements in environmental levels in the future.

More Information

A variety of mercury-related information is available at the DEP's Web site, www.state.nj.us/dep/ and www.state.nj.us/dep/dsr/mercury/. The Mercury Task Force report can be found at www.state.nj.us/dep/dsr/mercury_task_force.htm.

References

¹ Florida Department of Environmental Protection, 2003, <http://www.dep.state.fl.us/secretary/comm/2003/nov/1106.htm>.

² DEP, 2002, New Jersey Mercury Task Force, Volumes I, pp. 33 & 34, available on line at www.state.nj.us/dep/dsr/mercury_task_force.htm

³ DEP, 2002, New Jersey Mercury Task Force, Volumes I, II, and III

⁴ DEP, 2002, New Jersey Mercury Task Force, Volume III, page 18

⁵ N.J.A.C. Subchapter 27. Control and Prohibition of Mercury Emissions, <http://www.nj.gov/dep/aqm/1997adop.htm>

⁶ DEP, 2004, Mercury Switch Data Collection Pilot Project, prepared by Kenneth L. Woodruff, Morrisville, PA, available at www.state.nj.us/dep/dsr/hg-switch/full-report.pdf

⁷ P.L. 2005, c.054 (A2482 1R), available at http://www.njleg.state.nj.us/2004/Bills/PL05/54_.HTM